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(54) Protective sheathing for blasting materials

(57) An anti-fire-damp and coal dust explosion-proof protective covering for blasting materials, particularly for use in underground mining, contains an aqueous gel and magnesium hydroxide as an additive, and preferably contains perlite. The thus produced protective covering is more pliable than known ones, is less prone to damage and is chemically more stable, while at the same time improving the detonative properties of the explosive material protected by it.

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SPECIFICATION

Anti-fire-damp and coal dust explosion-proof protective sheathing for blasting materials

The invention concerns an anti-fire-damp and coal dust explosion-proof protective sheathing for blasting materials, particularly for use in undergound mining.

In underground mining, particularly in underground coal mining, blasting operations represent the potentially most dangerous source of hazard because detonation of the explosives may also explode coal-dust and methane gas. A great number of coal mines (in Hungary, 75%) belong the category of mines dangerous as regards fire-damp and coal-dust.

So-called anti-fire-damp explosives are already known, but they provide, only relative (not absolute) safety which can be achieved, according to the present state of art, in two ways: either by mixing so-called cooling salts with the explosive or by wrapping a protective casing around the explosive substance.

The cooling salts (e.g. NaCl, $CaCO_3$, etc.) reduce the probability of an explosion of methane and coal-dust by a cooling effect exerted during detonation. Their application has, however, a negative effect, since they considerably reduce the operative efficiency of the biasting material.

The protective casings or sheaths reduce the probability of an explosion by isolating the explosive from its surroundings. These are the so-called active protective sheaths, consisting of an explosive (blasting) material and cooling salts, and there are also the so-called passive protective sheaths, consisting generally, of cooling salts. In the active protective sheathing the detonation of the sheathing material pulverizes the cooling salts, thus increasing the protective effect. These already known protective casings or sheaths are rigid and damage-prone. Damage to the protective sheath in effect eliminates the protective effect.

Aqueous protective coatings are also known. These provide a high degree of safety against fire-damp explosion, but their preparation is difficult and cumbersome due to the fact that water can escape even through the slightest crack.

To eliminate this drawback protective coatings made of aqueous gels have been introduced. Although these are less danger-prone, water does not escape from them and, within certain limitations, they provide a satisfactory protective effect, they are not sufficiently plastic or pliable; thus e.g. on being placed in a bore-hole (blast-hole) the provision of a protective sheath of uniform thickness is problematic. A further particular disadvantage of the known protective sheathings made of aqueous gel is, that, due to the burning-up (combustion) of the organic substances contained therein, an exothermic chemical reaction takes place which may cause explosion of the methane gas. Furthermore, the already known protective sheathings containing aqueous gel have insufficient chemical stability.

The invention aims at the elimination or reduction of the disadvantages of known protective sheathings containing aqueous gel, and at providing protective sheathings of improved plasticity and chemical stability, compared with known protective sheathings of aqueous gel; furthermore, it is sought to provide coatings that during detonation do not exert an exothermic effect that would be dangerous from the point of view of a fire-damp explosion.

The invention is based on the discovery that magnesium hydroxide introduced into the aqueous gel forming the protective sheathing produces an endothermic effect which can compensate for or out the exothermic effect occurring during the combustion of an organic substance contained in the aqueous gel, thus reducing the danger of a blast and at the same time improves the mechanical and detonative properties of the blasting material protected by the sheathing.

An objective of the invention is accordingly to provide an anti-fire-damp and coal-dust explosion-proof protective sheathing for explosive materials, particularly for applications in underground mining, which contains an aqueous gel and, according to the invention, magnesium hydroxide as additive material. In a preferred embodiment of the invention the aqueous gel contains perlite.

The protective sheathing containing aqueous gel according to the invention is more pliable than the known ones, is less prone to damage and is chemically more stable. According to our experience, the changes occurring in the detonative properties of the protective sheathing according to the invention remain within a limit of ± 10% after a storage time of six months. The protective sheathing according to the invention somewhat surprisingly also improves the detonative properties of the explosive material protected by it, i.e. it increases the rate of the detonation by approximately 15—20% consequently increasing the working potential and the shattering power by approximately 30—50%.

According to the tests carried out in experimental tunnels or adits, 200 g explosive material provided with a 3—6 mm protective sheathing, according to the invention, does not cause explosion of fire-damp containing 8—12% methane gas, even when it was suspended in the interior of the adit or tunnel.

By varing the quantity of the thermally neutral perlite introduced as an additive substance to the magnesium hydroxide a protective sheathing can be produced which has a consistency satisfying all current requirements without affecting the advantageous properties of the protective sheathing according to the invention.

CLAIMS

1. Anti-fire-damp and coal dust-proof protective covering for blasting materials, particularly for use in underground mining, wherein said covering contains an aqueous gel

and said gel contains magnesium-hydroxide as an additive.

2. A covering according to claim 1 wherein the aqueous gel contains perlite.

3. A covering according to claim 1 or claim 2 substantially as herein particularly described.

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